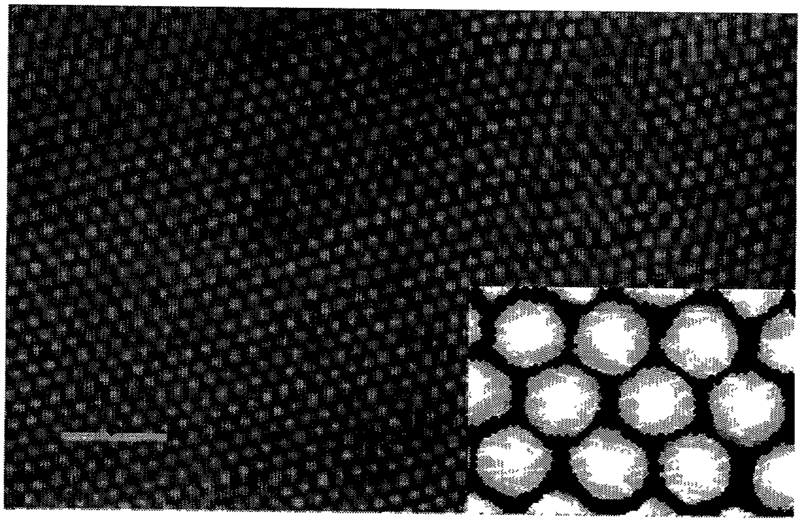


Figure 1a

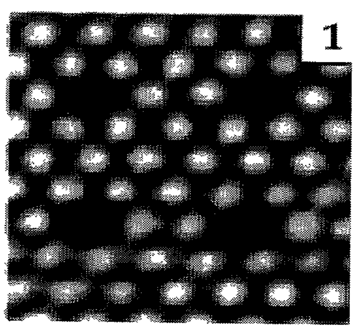


Figure 1b

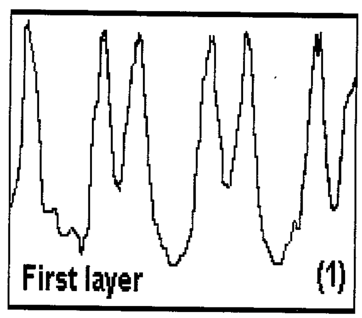


Figure 1c

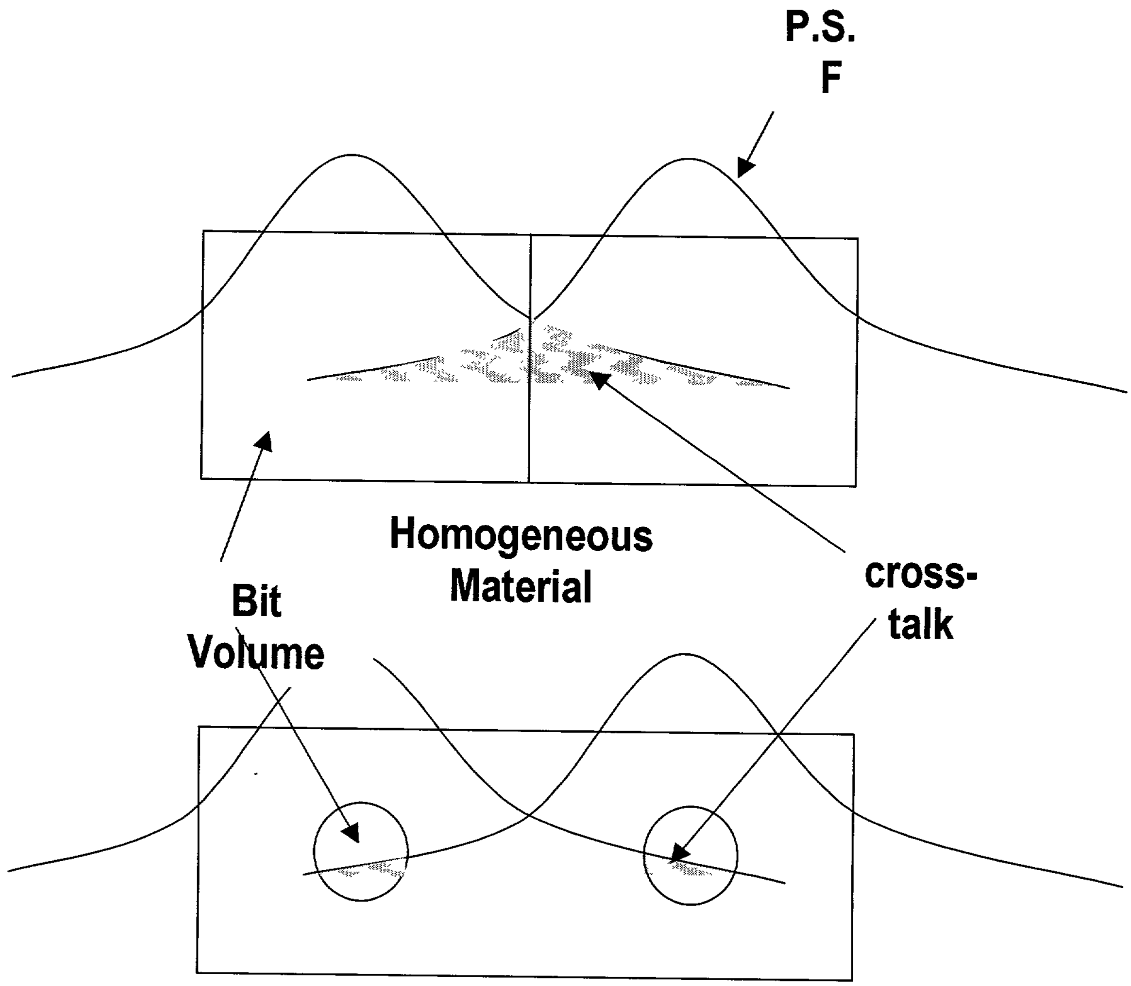


Figure 2. Nanostructured materials significantly reduce the cross-talk in the writing and reading processes by spatial isolation/separation of the active cores.

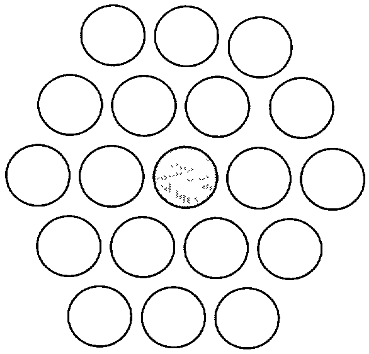
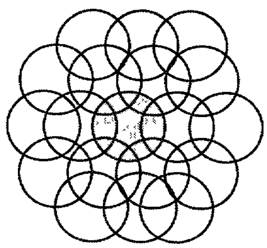


Figure 3a



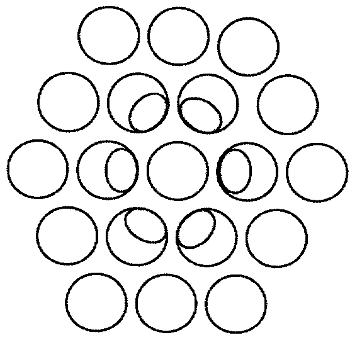
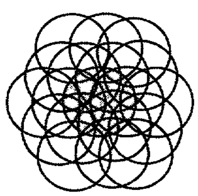


Figure 3b(i) Figure 3 b (ii)



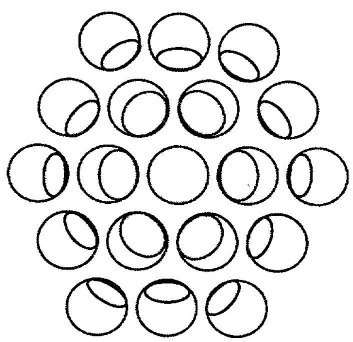


Fig 3c(i) Fig 3c(ii

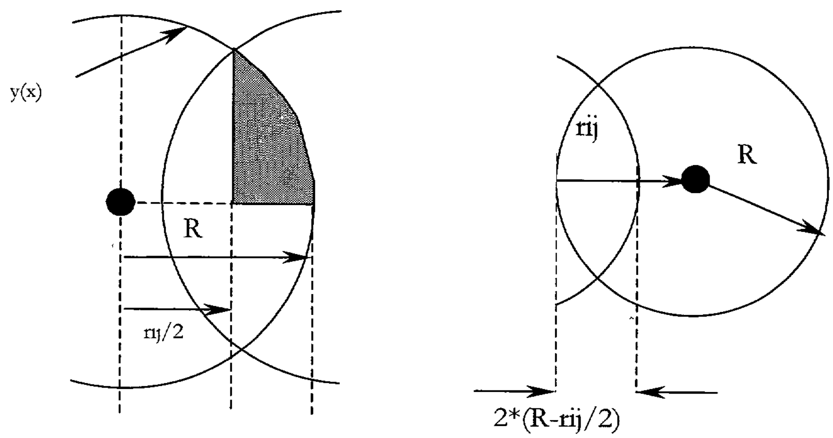
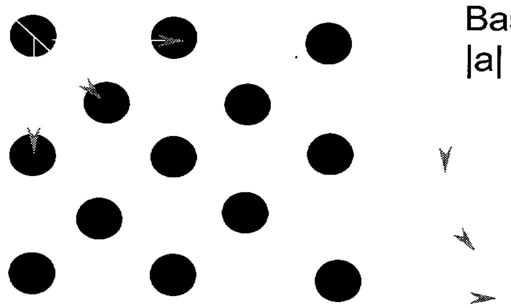


Figure 4a: Definitions of r, the spacin between the bits, and R, the radius o the diffraction pattern.



Basis vectors (x,y)
|a| = |b c| | = | =r

a= (0, r)

b= (sqrt(3)/2*r, r/2)

c = (sqrt(3)*r,0)

Figure 4b: Basis vectors and o the Lattice Translations

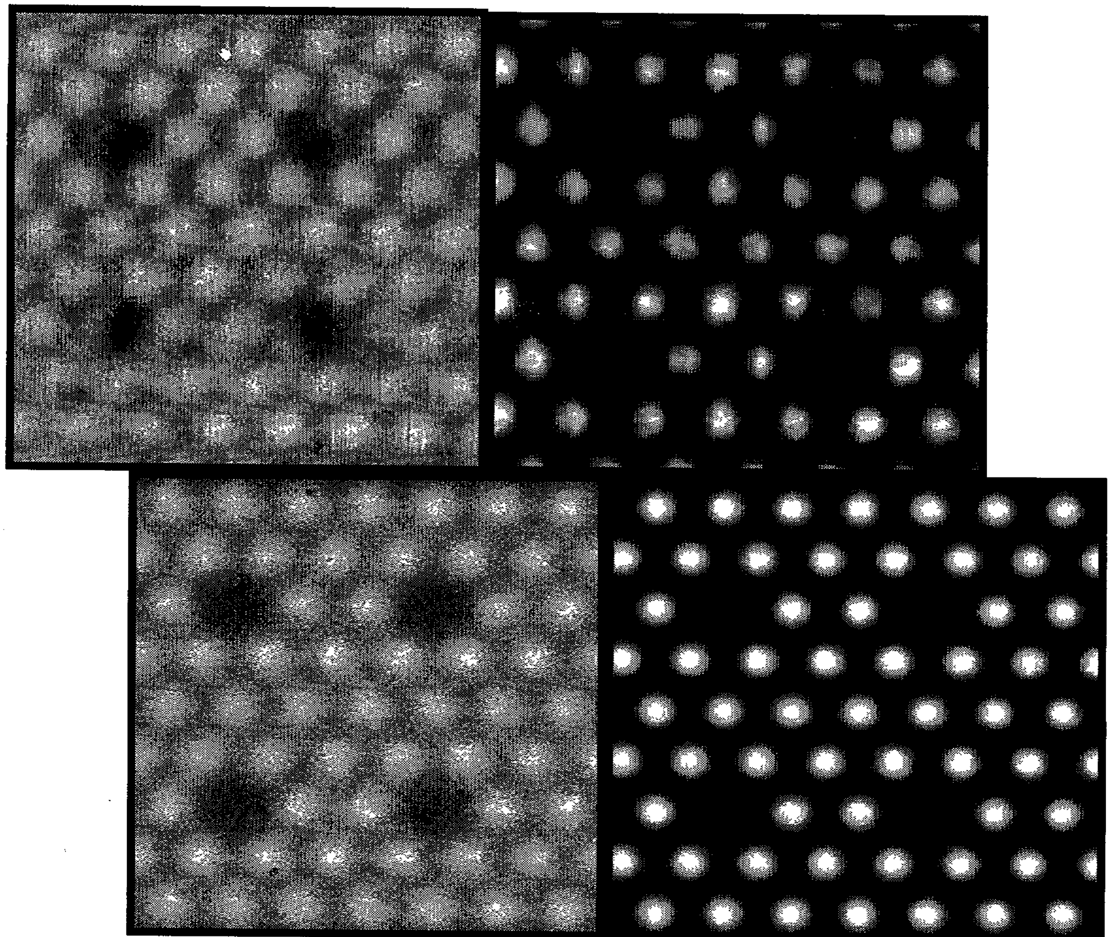


Figure 5 (top left) Laser confocal fluorescent microscopy image of nano-particle array.[2] The bits have core diameter 650 ± 20 nm and shell thickness 200 ± 5nm . $\lambda_{Fluorescnce}$~500 nm, $\lambda_{two\text{-}photon}$= 844nm. Resolution is approximately 256x256 samples. A data pattern has been photo-bleached into material **(top right)** After filtering and deconvolution approximate Gaussian point spread function. **(botttom right)** simulation of equivalent data with a sine squared basis bit **(bottom left)** with simulated point-spread function of diameter, 750nm and signal to noise ratio of 10.

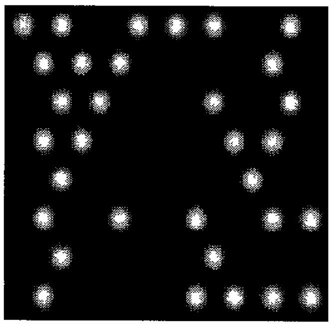


Figure 6a
r ~ λ
Overlap = 0%

Figure 6b
r ~ λ/2
Overlap = 50%
Rayleigh Limit

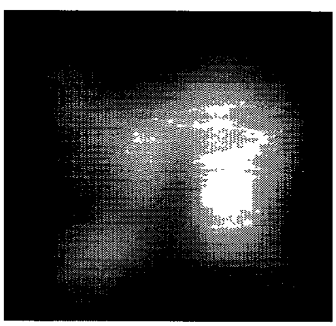


Figure 6c
r ~ λ/4
Overlap = 75%

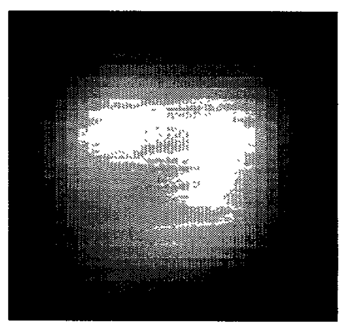


Figure 6d
r ~ λ/8
Overlap = 90%

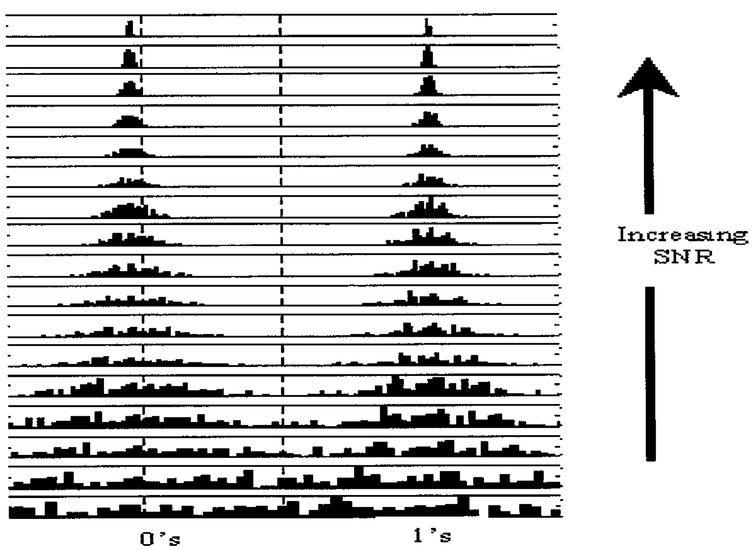


Figure 7: Bit distributions

Figure 8a

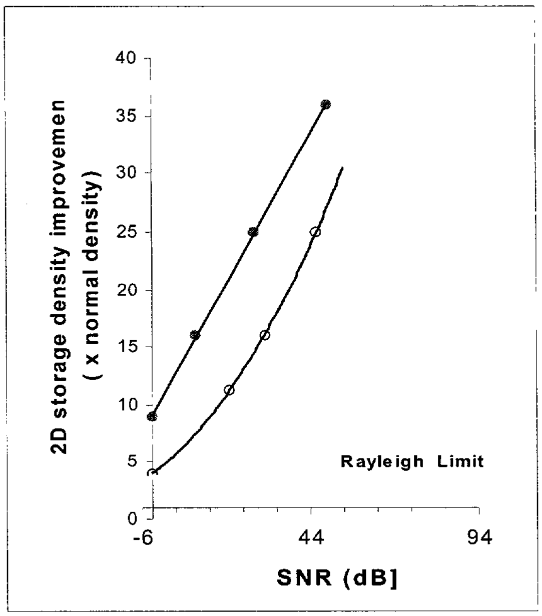


Figure 8b

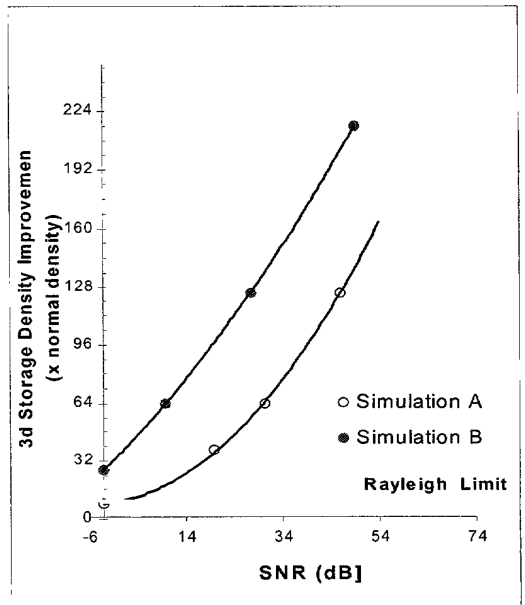


Figure 8c